Fact Sheet

STABILIZATION OF THAWING SOILS

PROBLEM

Thawing soils can greatly limit Army vehicle mobility. A line of communication (LOC) can deteriorate from one that all vehicles can pass to one that is totally impassable within a few days. The speed of deterioration of the LOC depends on the weather and the soil type.

SOLUTION

Several expedient stabilization methods appropriate for use on thawing soils were developed and evaluated at Fort McCoy, Wisconsin, during March 1995 in cooperation with the Wisconsin National Guard, the U.S. Army Engineer School, the U.S.D.A. Forest Service, and temporary-road product manufacturers. The test site and timing were chosen to afford construction and testing during the difficult conditions of spring thaw, and techniques were evaluated for expediency and ease of construction, as well as their performance during trafficking and their ability to enhance mobility.

The stabilization techniques were tested in three configurations: sloped sections with a 12% average grade; a pentagonal-shaped road to test cornering; and, the largest experiment, on a thawing wooded trail. The test surfaces consisted of the following and combinations thereof: chunkwood, tire chips, wood mats, tire mats, fascines, tree slash, and geosynthetics. There was minimal trail preparation prior to placing the materials and the details of the construction of each surface were carefully observed and noted (equipment and personnel, construction time, volume of material, method, difficulty, etc.). Prior to construction, the terrain was characterized by soil type, soil strength properties, state of ground frost, and topography.

After the test sections were completed, the trail was trafficked with wheeled and tracked vehicles. During the trafficking, both vehicle performance and test surface performance were periodically monitored for test surface damage through rutting and lateral expansion, material interference with the vehicles, vehicle traction or handling problems, ride quality, and speed.

RESULTS

Findings from the test and evaluation program are summarized in a decision matrix that can be incorporated into engineering decision aids and simulations. Although the test and evaluation were performed with military vehicles, the techniques are suitable for many civilian applications where travel on thawing ground would be beneficial, such as the construction, mining, oil, and forestry industries. The project has been documented in a video as well as in various CRREL reports and professional papers. Future research will focus on the combination of various methods and on the development of new techniques.

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